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ABSTRACT

This study, conducted at a major western Canadian university, examined the relation between the academic growth and development of dental students and perceived control, a personalogical variable; and academic and social institutional integration variables. Two questionnaires with an academic focus were administered to 67 students. The theoretical model developed contained three perceived control variables, two measures to evaluate academic goals and career commitment, seven measures of academic integration, three measures of social integration, and one measure of academic outcome. Results indicated that students who assumed personal responsibility for their academic performance reported more academic growth and development, that students more actively involved in the learning process and more stimulated academically reported higher levels of academic growth, and that favorable interactions with peers positively affected academic growth. Results support the collective importance of the perceived control variable, which in combination with academic and social integration variables contributed substantially and positively to students' reported academic growth. (Contains 40 references.) (Author/CK)

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Influences on the Academic Achievement of Undergraduate Dental Students

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This research was presented at the Association for Institutional Research Forum in Albuquerque in May, 1996. ***Address correspondence to Frank J. Hechter, Faculty of Dentistry, The University of Manitoba, Winnipeg, Manitoba, CANADA, R3T 2N2.***

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for Management Research, Policy Analysis, and Planning

This paper was presented at the Thirty-Sixth Annual Forum of the Association for Institutional Research held in Albuquerque, New Mexico, May 5-8, 1996. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum Papers.

Jean Endo
Editor
AIR Forum Publications

Abstract

The purpose of this investigation was to examine the relation between the academic growth and development of dental students and perceived control, a personological variable; and academic and social institutional integration variables. The study was conducted in the Faculty of Dentistry at a major western Canadian university and consisted of two self-administered questionnaires during the 1992-1993 academic year. The data were analysed using a series of multiple regression analyses. The combination of perceived control, and academic and social integration were found to have significant effects on students' perception of their academic growth and development (R Square=0.627). The findings of this investigation suggest that student perceptions of their academic growth and development are significantly influenced by perceived control. In addition, these results support the importance of the interpersonal and social context of teaching and learning. Individual student attributes and positive academic and social interactions with professors and dental student peers are important factors in students' perceptions of their academic growth and development. The results have important implications for admission, and for curriculum and instruction.

Introduction

As the costs of professional education continue to rise and financial resources shrink, professional education programs will continue to experience increasing pressure to examine institutional activities in a critical fashion, and demonstrate efficiency and effectiveness. This larger issue will be examined through a specific lens: one genre of professional school. This study built on the results of a cross-sectional Canada-wide survey, entitled the Dental Student Problems Questionnaire, (Clark, et al., 1986; Bradley et al., 1989) which identified problems such as cynicism, alienation, and stress as factors that may interfere with the educational process in Canadian dental colleges.

Interest in the educational environment of dental college has been stimulated by informal, anecdotal, but persistently unfavourable comments regarding dental college experiences. Annually, talented, bright, academically accomplished individuals are accepted into professional programs, including dental colleges. First year students arrive prepared for and enthusiastic about the challenges of their newly chosen profession. These students expect to be intellectually challenged; but they also expect a well-planned, organized professional environment which preserves their personal integrity and dignity. Over the course of their professional program, however, some students become extremely disillusioned with the educational process, and expressions of bitter feelings are not uncommon.

This study was motivated by a concern about this perceived dissatisfaction, and is an attempt to offer an explanation of student accounts of their experiences in dental college. The research design was informed by Tinto's theory of student departure (1975;1987), and integrates sociological (environmental impact) and psychological (perceived control) perspectives. These theoretical elements allowed an examination of the factors that might contribute to success and satisfaction in dental education; and specifically, whether the individual difference variable, perceived control, interacts with institutional influences to facilitate or impede the acquisition and development of academic and intellectual skills.

Conceptualization

Student motivation and academic performance in college is a complex interaction involving both student characteristics and the educational environment (Perry, 1991). Student perceptions of their educational environment are, therefore, thought to influence academic achievement and persistence. Several environmental theories have been proposed that account for student change. Generally referred to as impact models, these models concentrate on the process and the origins of change more than on any particular internal process or dimension of change. Included under this rubric are: Astin's theory of "Involvement" (1970; 1984); Weidman's model of undergraduate socialization (1989); Pascarella's general model for assessing change (1985); and Tinto's theory of student departure (1975; 1987).

Tinto's theory has been utilized to study other student outcomes, specifically academic growth (Terenzini & Wright, 1987), and was therefore thought an appropriate model for this investigation. Tinto's model, longitudinal in design, seeks specifically to explain temporally the college student attrition process. Tinto theorizes that students enter college with varying patterns of personal, family, and academic characteristics and skills, which include initial dispositions and intentions with respect to college attendance and personal goals. He maintains that student behaviour is an interactional process reflecting both individual and organizational attributes. Student intentions and commitments are subsequently modified and reformulated on a continuing basis through a series of interactions between the individual and the structures and members of the academic and social systems of the institution. Satisfying and rewarding encounters with both the formal and informal academic systems of the institution are presumed to lead to greater integration in those systems and thus to student retention.

The dominant elements of Tinto's theory are students' level of academic and social integration. "Other things being equal, the higher the degree of integration of the individual into the college systems, the greater will be (the) commitment to the specific institution and to the goal of college completion" (Tinto, 1975, p. 96). The term integration is understood to refer to the extent to which the individual shares the normative attitudes and values of peers and faculty in the institution and abides by the formal, and informal structural requirements for membership in that community or in the subgroups of which the individual is a

part. Academic and social integration may describe both a condition (the individual's place in the academic and social systems) and/or an individual perception (the individual's personal sense of place in those systems). Negative interactions and experiences tend to reduce integration, to distance the individual from the academic and social communities of the institution, promoting the individual's marginality and ultimate withdrawal. Tinto's model is mainly, although not entirely, concerned with intra-institutional influences on students and with the influences upon students by others, both within and outside the institution. It therefore provides a theoretical and quantifiable evaluation of the social context. Psychometrically sound scales, developed to measure both academic and social aspects of Tinto's integration construct, have been incorporated in this investigation (Fox, 1984; Pascarella & Terenzini, 1980; Terenzini, Lorang, & Pascarella, 1981; Terenzini, Pascarella, & Lorang, 1982).

Tinto's longitudinal model, although focused on the college attrition process, has been employed to study other student outcomes, including students' reports of academic skill acquisition (e.g., Terenzini, Theophilides, & Lorang, 1984; Volkhein, King, & Terenzini, 1986; and Terenzini & Wright, 1987a); personal change (e.g., Terenzini & Wright, 1987b); and major field changes (e.g., Theophilides, Terenzini, & Lorang, 1984). Neither Tinto's model nor other applications, however, include psychological individual difference variables. Recent research in educational psychology has suggested that some of these personality-like variables (e.g., perceived control, Perry, 1991; self-worth, Covington, 1993 and others) influence how students view and react to their educational environment. Perry (1991) suggests that these individual difference variables provide a buffer/barrier or compensatory effect for students in both enriched and impoverished educational environments.

The concept of perceived control has been prominent in psychological theory and research, and has been linked to a variety of phenomena (e.g., academic achievement, aging, health, and the like). A review of the history and applications of the perceived control construct may be found elsewhere (Perry, 1991). The notion of control is an important concept because it reflects individuals' perception of how their personal attributes influence their environment or social world.

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Perceived control refers to an individual's perceived ability both to predict and influence outcomes and events in his/her environment, and therefore is thought to be critical to understanding how people relate to their environment. The emphasis on perceived, as opposed to objective, control reflects the "phenomenological distinction between what the individual believes about his/her capacity in contrast to what actually exists" (Perry, 1991, p.2). Perceived control has been conceptualized along a continuum (Perry, 1991), anchored at one end by helplessness (loss of control/unstable; i.e., "being out of control"), and at the other by mastery (control/stable; i.e., "being in control"). Differences in the level of perceived control are thought to determine subsequent cognitive, emotional, and behavioural developments. Central to the perceived control construct is the assumption that beliefs about control can influence behavioural reactions and thereby, determine effective adaptation to the environment.

Students' perceived control has been linked with both academic motivation and achievement, i.e., the more responsibility one takes for academic achievement, the better one performs (Dweck & Reppucci, 1973; Garber & Seligman, 1980; Schunck, 1981; Stipek & Weisz, 1981). Perry and his associates, using a laboratory analog, have consistently demonstrated the relationship of students' perceived control and college instruction (e.g., Perry & Dickens, 1984, 1987; Perry & Magnusson, 1987; 1989).

Since differences in perceived control have been demonstrated to influence subsequent cognitive, emotional, and behavioural developments in students, perceived control variables were incorporated in an amended version of Tinto's model addressing educational outcomes in a dental faculty. The theoretical model that guided this investigation is presented in Figure 1. The model follows the temporal sequencing theorized by Tinto and, therefore, was analysed in a left to right direction. The pre-entry variables, social background and pre-dental university education variables, were included for descriptive purposes and were not included in subsequent testing of the theoretical model.

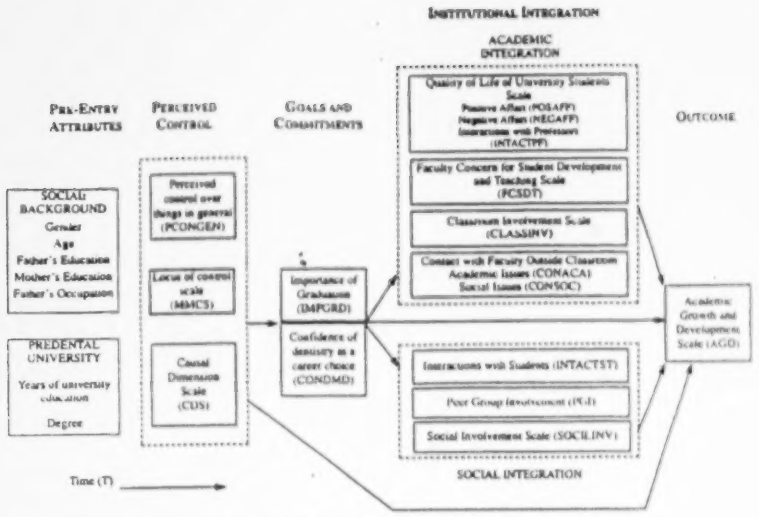

Figure 1 - Amended Model of Academic Growth and Development (AGD)

The primary purposes of this investigation were: 1) to identify and evaluate influences on dental students' academic growth and development through a combination of sociological and psychological perspectives; 2) to determine whether the individual difference variable, perceived control, interacts with institutional influences to facilitate or impede the acquisition and development of academic and intellectual skills; and 3) to identify those influences on reported academic development that might be responsive to institutional or programmatic action.

Method

Subjects

This investigation was conducted during the 1992 - 1993 academic year in the Faculty of Dentistry at a major western Canadian university. All undergraduate dental students (N= 97) were invited to participate in the study.

Sixty-seven students completed the first survey, representing a participation rate of 69.1%. Sixty-seven students participated in the second survey, of whom 59 had also participated in the first survey, representing 60.8% of the undergraduate dental student population. Eight students, who had completed Survey 1, did not complete Survey 2. Additionally, eight students who had not completed Survey 1, completed Survey 2. In

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total, seventy-five students participated in either Survey 1 or Survey 2. Only individuals who had participated in both Survey 1 and 2 (N=59) were included in the data analyses. Table 1 presents the distribution of participants by year of study and gender. The comparatively low participation rate of students in the so-called "clinical years" (years 3 and 4) should be noted.

Year of Study	Male	Female	Total
1	10 (66.7)	9 (90.0)	19 (76.0)
2	11 (68.8)	6 (66.6)	17 (68.0)
3	7 (43.8)	4 (44.4)	11 (44.0)
4	10 (62.5)	2 (33.3)	12 (50.0)
Total	38 (60.3)	21 (61.8)	59 (60.8)

Values in ( ) represent the percentage of the undergraduate dental student population who participated by year of study and gender.

Table 1 - Distribution of Participants by Year of Study and Gender

Research Procedures

The study consisted of two self-administered surveys with an academic focus, the first conducted in the fall academic term (November, 1992), and the second in the final month (April, 1993) of the academic year. The first survey incorporated measures of the perceived control variable derived from the areas of social cognition and personality including: a) multidimensional-multiattributional causality scale (Lefcourt, Von Baeyer, Ware, & Cox, 1979); b) perceived control item (Perry, 1991); c) Causal Dimension Scale (Russell, 1982). Also incorporated in Survey 1 were measures of academic goal and career commitment, the Quality of Life of University Students scale (Roberts & Clifton, 1992), as well as socio-demographic items.

Survey 2 included measures of academic and social integration. Written permission was secured to use the following scales: self-reported contacts, both academic (CONACA) and social (CONSOC) with faculty members over the academic year; faculty concern for student development and teaching scale (FCSDT); peer group interaction scale (PGI); classroom involvement scale (CLASSINV); and social involvement scale (SOCILINV). The dependent variable, students' perception of their academic growth and development, was also included in the second survey. These variables were drawn from the works of Fox, 1984; Pascarella & Terenzini, 1980; Terenzini, Lorang, & Pascarella, 1981; and Terenzini, Pascarella, & Lorang, 1982. The wording of items was amended to reflect the students and experiences in a dental faculty, as opposed to an

undergraduate liberal arts and science institution. Both surveys took approximately an hour to complete and were administered in a lecture theatre in the medical-dental complex.

Participants were solicited using techniques designed to generate high participation rates, outlined in survey research methodology books. An information package, describing the research project, was prepared and distributed to all students in their individual faculty mailboxes. Included in the package was a statement on the purpose of the project, the activities involved, the anticipated time involvement, and the methods of protecting confidentiality. The voluntary nature of participation was made clear and the option to withdraw at any point was indicated. In addition, the academic background of the primary investigator, including his role in academia, was made known to potential participants. Moreover, the role of the research project in the researcher's academic pursuits was identified. Included in the information package was a consent form for participation in the study. Students were informed that the project was concerned with student life in, and student attitudes toward, the Faculty of Dentistry as these relate to academic growth and development. It was anticipated that the issue of confidentiality of responses would be an important student concern. Accordingly, arrangements were made to preserve participant confidentiality including data entry of responses and coding of participants was done by a research scientist located at an off-campus health-oriented research facility. In the days prior to the administration of Survey 1, the primary investigator met separately with each dental class to answer any questions and respond to any concerns.

Materials[1]

Three perceived control variables were included in the theoretical model. Perry's (1991) single item global measure of perceived personal control was incorporated as a measure of respondents' dispositional tendencies of their level of control over things in general (PCONGEN). The positively worded subset of the multidimensional-multiattributional causality scale - MMCS (Lefcourt, von Baeyer, Ware, & Cox, 1979) was included as a dispositional measure related generally to academic achievement. Russell's (1982) causal dimension scale (CDS) was used to measure causal explanations for a specific event, namely academic

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[1] *The precise wording and scoring of the variables used in this investigation are available on request.*

performance in the dental program. This variable represents the situational approach to perceived control.

Two measures were included in the theoretical model to evaluate academic goals and career commitment - the importance of graduating from dental college (IMPGRD); and confidence in choice of dentistry as profession (CONDMD).

Seven measures of academic integration were incorporated in the theoretical model. Following Tinto's theory, these variables were conceptualized as measures of students' institutional experiences that shape their personal integration. The academic integration variables consisted of the positive affect (POSAFF), negative affect (NEGAFF), and interaction with professors (INTACTPF) variables from the Quality of Life of University Students instrument developed by Roberts and Clifton (1992); and scales developed by Pascarella and Terenzini (1980) and Terenzini, Pascarella, and Lorang (1982), including faculty concern for student development and teaching (FCSDT), classroom involvement (CLASSINV), and contact with faculty outside the classroom (CONACA & CONSOC).

Three measures of social integration were included in the theoretical model. These measures included: interaction with students (INTACTST) from the Quality of Life of University Students (Roberts & Clifton, 1992); peer group involvement - PGI (Pascarella & Terenzini, 1980); social involvement - SOCILINV (Terenzini, Pascarella, & Lorang, 1982).

One measure of academic outcome, self-reported academic growth and development (AGD), developed by Terenzini, Pascarella, & Lorang, 1982, was included in the theoretical model. Table 2 presents the descriptive analyses of the variables including the number of items, response options, range of possible scores, range of responses, mean, standard deviation, and the internal reliability of all multiple item variables assessed using the Cronbach statistic.

Variable	No. of Items	Response Options	Range of Possible Scores		Range of Responses		Mean	STD Dev	Alpha Reliability Coefficient
			Min.	Max.	Min.	Max.			
Perceived Control Variables									
PCONGEN	1	10	1	10	2	10	7.05	1.62	n/a
MMCS	12	5	-24	24	-18	18	2.24	7.41	0.62
CDS	9	9	9	81	20	71	52.84	9.89	0.58
Academic Goal and Career Variables									
IMPGRD	1	10	1	10	8	10	9.74	0.58	n/a
CONDMD	1	10	1	10	3	10	8.43	1.73	n/a
Academic Integration Variables									
POSAFF	13	4	13	52	30	51	41.71	4.78	0.81
NEGAFF	4	4	4	16	4	16	10.37	2.65	0.79
INTACTPF	9	4	9	36	13	33	25.53	3.24	0.90
FCSDT	5	5	5	25	7	23	14.92	3.40	0.63
CLASSINV	6	4	6	24	9	24	14.85	2.49	0.69
Social Integration Variables									
INTACTST	5	4	5	20	10	19	15.44	2.02	0.75
PGI	7	5	7	35	13	30	22.78	3.71	0.50
SOCILINV	5	4	5	20	5	15	12.76	3.29	0.74
Academic Outcome									
AGD	8	5	8	40	13	38	28.48	4.41	0.80

Table 2 - Descriptive Analysis of Variables

Key:

AGD	*Academic growth and development*
PCONGEN	*Perceived control over things in general*
MMCS	*Multidimensional-multiattributional causality scale*
CDS	*Casual dimension scale*
IMPGRD	*Importance of graduating from dental college*
CONDMD	*Career commitment*
POSAFF	*Positive affect*
NEGAFF	*Negative affect*
INTACTPF	*Interaction with professors*
FCSDT	*Faculty concern for student development and teaching*
CLASSINV	*Class involvement*
INTACTST	*Interaction with students*
PGI	*Peer group involvement*
SOCILINV	*Social involvement*

Results

The original intent of this investigation was to test the theoretical model presented in Figure 1. Practical issues, notably the subjects-to-independent variable ratio and the restricted variability of some variables, made a full test of the original theoretical model impossible. Consequently, a limited model incorporating no more than six independent variables was tested. The following criteria influenced variable selection for the limited model: little variance of some variables; empirical evidence (i.e., strength of correlation with the dependent measure); variable redundancy; temporal considerations; and previous use in other applications of Tinto's model (1975;1987). Scrutiny of the descriptive statistical analyses identified variables with limited variance, including: the academic goal commitment variable (IMPGRD); and the contact with faculty out of the classroom (CONACA and CONSOC). Consequently these variables were not included in the limited model. A correlation matrix was generated for the variables in the original model to assess the strength of correlation with the dependent measure, AGD, as well as variable redundancy. The correlation coefficients with the dependent variable (AGD) is presented in Table 3.[2] The variables were

[2] *The complete correlation matrix is available on request.*

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correlation coefficients with the dependent variable (AGD) is presented in Table 3.[2] *The variables were examined by variable set.*

	AGD
Academic growth and development (AGD)	1.000
Perceived control over things in general (PCONGEN)	.333*
Multidimensional-multiattributional causality scale (MMCS)	.411**
Causal dimension scale (CDS)	.480***
Importance of graduating from dental college (IMPGRD)	-.109
Career commitment (CONDMD)	.018
Positive affect (POSAFF)	.178
Negative affect (NEGAFF)	-.043
Interaction with professors (INTACTPF)	.118
Faculty concern for student development and teaching (FCSDT)	-.161
Class involvement (CLASSINV)	.694***
Interaction with students (INTACTST)	.177
Peer group involvement (PGI)	.643***
Social involvement (SOCILINV)	.456***

*p < .05 **p < .01 ***p < .001

Table 3 - Correlation Matrix Of The Variables In The Variables In The Theoretical Model

As a consequence of the selection process, the limited model tested included: two perceived control variables - Russell's casual dimension (CDS) scale (1982), and multidimensional-multiattributional causality (MMCS) scale (Lefcourt et al., 1979); two academic integration variables - classroom involvement (CLASSINV) scale (Terenzini, Pascarella, and Lorang, 1982), and faculty concern for student development and teaching (FCSTD) scale (Pascarella & Terenzini, 1980); and two social integration variables - peer group involvement (PGI) scale (Pascarella & Terenzini, 1980), and social involvement (SOCILINV) scale (Terenzini, Pascarella, & Lorang, 1982). The limited model is presented in Figure 2.

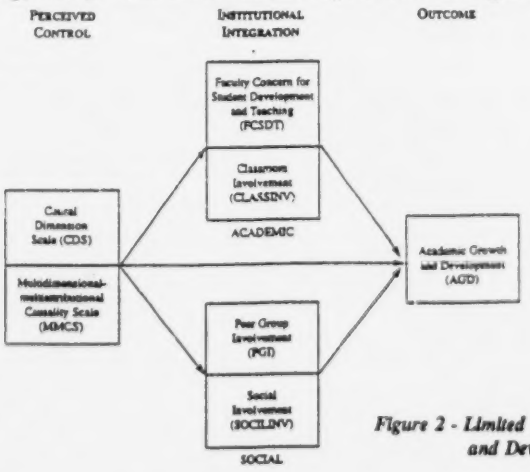

Figure 2 - Limited Model of Academic Growth and Development

[2] *The complete correlation matrix is available on request.*

In order to reflect the conceptual and temporal nature of the theoretical model, a series of multiple linear regression equations was used to estimate the effects of the perceived control variables and academic and social integration variables on students' perceptions of their academic growth and development. The unique contribution of the independent variables on the total variance of the dependent variable, academic growth and development (AGD), was estimated with semipartial correlation coefficients (Tabachnick & Fidell, 1989). The analysis consisted of three steps. The three steps of the regressions of academic growth and development (AGD) variable on the variables in the limited model are summarized in Table 4. The squared semipartial correlations, standardized regression coefficients, R Square, sum of the squared semipartial correlation coefficients, and the shared variance are also presented in Table 4.

Independent Variables	Step 1			Step 2		Step 3
	Stage 1	Stage 2	Stage 3	Stage 1	Stage 2	
Perceived Control						
CDS	.116**			.062*	.072*	.056*
	(.359)			(.276)	(.286)	(.263)
MMCS	.057			.032	.032	.021
	(.253)			(.190)	(.191)	(.190)
Academic Integration						
FCSDT		.013		.036		.023
		(-.116)		(-.196)		(-.159)
CLASSINV		.379***		.215***		.077**
		(.616)		(.496)		(.364)
Social Integration						
PGI			.200***		.147***	.078**
			(.520)		(.462)	(.349)
SOCILINV			.009		.007	.001
			(.108)		(.098)	(-.036)
R Square	.251	.393	.339	.542	.510	.627
Sum of sr^2	.173	.392	.209	.345	.258	.255
Shared variance	.078	.001	.130	.197	.252	.372

* p<.05 ** p<.01 *** p<.001

Values in ( ) are standardized regression coefficients

Key:
- CDS — Causal dimension scale
- MMCS — Multidimensional-multiattributional causality scale
- FCSDT — Faculty concern for student development and teaching variable
- CLASSINV — Classroom involvement variable
- PGI — Peer group involvement variable
- SOCILINV — Social involvement variable

Table 4 - Selected Output of the Multiple Regressions of Academic Growth and Development Variable on the Perceived Control, the Academic, and the Social Integration Variables

In the first step, the direct effects of the independent variables on the dependent variable were computed. The first step consisted of three stages. In the first stage, AGD was regressed on the perceived control variables (CDS and MMCS). The adjusted R Square value was 0.251. Squared semipartial correlation coefficients identify the unique contribution of an independent variable to the dependent variable.

The CDS accounted uniquely for 11.6% ($p < .01$), and MMCS accounted for 5.7% of the variance in the academic growth and development variable. The difference between the R Square value (25.1%) and the sum of the semipartial correlation coefficients (11.6 + 5.7 = 17.3%) is a measure of the shared variance (7.8%) between these independent variables. These results suggested that internally oriented students who provide internal, stable, and controllable explanations for their academic performance reported more academic growth and development.

In the second stage, AGD was regressed on the two academic integration variables (FCSDT and CLASSINV). The R Square value was .393. The CLASSINV variable accounted uniquely for 37.9% ($p < .001$) of the variance of AGD, while the FCSDT variable accounted uniquely for 1.3% of the variance of the dependent variable. Only 0.10% of the variance was shared between these two measures of academic integration. The results suggested that students who have been stimulated academically and been actively involved in the learning process in the classroom report higher levels of academic growth. In addition, these results suggested that students' academic advances are affected minimally, and negatively, but not statistically significantly by their perception of faculty members' concern for their academic development and teaching.

In the third stage, AGD was regressed on the two social integration variables (PGI and SOCILINV). The PGI variable accounted uniquely for 20% ($p < .001$) of the variance, while the SOCILINV variable had an almost negligible unique effect, accounting for only 0.90% of the variance of the dependent variable, Academic growth and development. However, 13% of the variance was shared by these two social integration variables. These results support the importance of the quality of interaction with student peers to academic growth.

In the second step, the effects of the perceived control variables and the institutional integration variable sets were estimated while controlling the other variables. The second step consisted of two stages. In the first stage, AGD was regressed on the two perceived control variables (CDS and MMCS) and the two academic integration variables (FCSDT and CLASSINV). The unique effects of the independent variables were estimated through the use of semipartial correlation coefficients. Two of the independent variables were statistically significant, the CLASSINV variable ($p < .001$), and the CDS ($p < .05$). The unique effects of

the independent variables were: CDS - 6.2%; MMCS - 3.2%; FCSDT - 3.6%; CLASSINV - 21.5%. The difference between the sum of the squared semipartial correlation coefficients (34.5%) and the R Square value (54.2%) suggested that these variables share 19.7% of the variance. The results suggested that students who indicate internal, controllable, and stable explanations for their academic achievement, in combination with academic stimulation and a high degree of involvement in classroom activities, report higher academic performance than students who are less academically stimulated and are not as involved in classroom related activities. The R Square value (.542) increased substantially when compared to the stage when the direct effects of the perceived control (R Square = .251), and the academic integration variables (R Square = .393) on the academic growth and development variable were computed. These results suggested that the effects on academic growth and development were enhanced through the combination of the perceived control and academic integration variables.

In the second stage of step 2, AGD was regressed on the two perceived control variables (CDS and MMCS) and the two social integration variables (PGI and SOCILINV). Two independent variables were statistically significant, PGI ($p < .001$), and CDS ($p < .05$). The unique effects of the four independent variables were: CDS - 7.2%; MMCS - 3.2%; PGI - 14.7%; SOCILINV - 0.7%. The results suggested that these variables share 25.2% of the variance. The results indicated that the peer group involvement (PGI) variable was statistically significant even after the perceived control variables were controlled. This reaffirmed the importance of favourable peer group interaction in students' academic growth.

In the third and final step, the AGD variable was regressed on the perceived control (CDS and MMCS), academic (FCSDT and CLASSINV), and social (PGI and SOCILINV) integration variables. This regression equation accounted for 62.7% of the variance of the AGD variable. Three independent variables were statistically significant, peer group (PGI) involvement ($p<.01$), classroom involvement (CLASSINV) variable ($p<.01$), and casual dimension (CDS) scale ($P<.05$). The unique effects of each of the independent variables on the dependent variable were as follows: CDS (5.6%); MMCS (2.1%), FCSDT (2.3%); CLASSINV (7.7%); PGI (7.8%); and SOCILINV (0.1%). Comparison of the sum of the squared semipartial correlation coefficients with the R Square value suggests that 37.2% of the variance is shared

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among the independent variables. This finding provides support for Perry's (1991) observation that student academic performance in college is a complex process involving student characteristics (perceived control), and the educational experience (academic and social integration).

The results indicate that students who assumed personal responsibility for their academic performance reported more academic growth and development. In addition, these results suggest that students more actively involved in the learning process and stimulated academically report higher levels of academic growth. Moreover, favourable interactions with peers affected academic growth positively. The results support the collective importance of the perceived control variable, which in combination with academic and social integration variables, contribute substantially and positively to students' reported academic growth and development.

Limitations of this Study

This study has several limitations. The first of these concerns the extent to which any theoretical model can explain a complex process such as academic growth and development. While a relatively large percentage of the variance of students' reported academic growth and development is explained by the variables in the model, the explanatory power of the theoretical model may have been increased by variables which were not included.

The second limitation concerns the relatively short period of time (one academic year) over which the study was conducted. Tracking students over their entire undergraduate dental program would have been preferable and likely more informative.

The third limitation involved the validity of self-reported perceptions of academic growth and development. The exact relationship between students' self-reports of academic growth and more objective measures of academic growth is not known. This study initially contemplated the use of actual grade-point average as the dependent variable, but was abandoned primarily because the number of examinations and the proportion of didactic and clinical courses varied dramatically by year of study.

The fourth limitation is that the results are based on the responses of students and their experiences at a single institution. To the extent that these students and their experiences differ from students at other

dental faculties, the results may not be generalizable beyond the institution at which the study was conducted.

Another limitation to the results of this investigation involves the influence the investigator may have had on student participation and responses. At the time the study was conducted, the researcher was a part-time faculty member in the dental faculty, with teaching responsibilities only in the graduate Orthodontic program. However, considering the anxiety and lack of trust of some students concerning faculty members, the mere fact that the investigator was a faculty member may have influenced the decision to participate and even the responses. Unfortunately, the impact of the influence of the investigator cannot be quantified.

The sixth limitation involves the disappointing participation rate of students, particularly in the so-called clinical years, i.e., third and fourth years, of the dental program, which was low. A review of the project journal was somewhat informative. Several students approached the investigator and under the assurance of anonymity, indicated that despite the safeguards to preserve confidentiality of respondents, they did not participate because of their perceived vulnerability and fear of reprisal. They reflected on the small size of the dental student population and their concerns about confidentiality of responses to the survey instrument. Leaks in confidentiality would render them vulnerable because they felt evaluation, particularly on the clinic floor, was very subjective. These comments were very distressing and were likely reflected in the participation rate. The potential effect of non-response bias, therefore, is noted as an important limitation.

Discussion

The influence of perceived control on academic achievement was consistent with previous theoretical and empirical investigations (e.g., Covington, 1993; Perry, 1991). The results of this investigation provided additional empirical evidence, in a field setting, for the important influence of the perceived control variable on academic achievement. Moreover, the results suggest that personality-like variables (e.g., perceived control, Perry, 1991) influence how students view and react to their educational environment. Students with a mastery orientation may be buffered from the demands of their educational experiences in the dental college environment. These results may have interesting implications for admission criteria and, moreover, for monitoring and possibly identifying students "at-risk".

In addition, the results offer strong support for the academic and social integration components of Tinto's (1975;1987) model of college student attrition. Moreover, this study provided additional support for these institutional components in the study of other student outcomes. More academically stimulated and actively involved students reported greater gains in academic growth. This finding is significant in that it suggested that academic success may be facilitated by teaching practices that promote classroom activity. Equally important is that these elements of effective teaching can themselves be learned by faculty members (Pascarella & Terenzini, 1991; Weimer, 1990). A major conclusion of this study is that teaching practices that actively involve students and stimulate them academically , themselves learnable, positively influenced student learning. A vexing concern, however, is that those students with low perceptions of control may not be able to benefit from these effective teaching practices (Perry, 1991).

The social integration variables accounted for 7.8% of the variance of the dependent variable, academic growth and development, and the peer involvement (PGI) variable accounted for 7.7%. The findings of this investigation provided support for the positive influence of the 'student group' as an important element in academic achievement and, likely, for the provision of social support.

Moreover, these results support the importance of the interpersonal and social context of teaching and learning and are consistent with the findings of contemporary learning theorists (Brookfield, 1986; Schon, 1987; Cross, 1988) who assert that effective learning does not result only from the enactment of skilled performances of the instructor alone, but rather from a structuring of the social arrangements between instructors ans students, and among students. This approach is consistent with Nash's (1992) call to eliminate from the culture in dental education the barriers that interfere with dental colleges "being the very best they can possibly be in their mission of patient care, education, research, and public and professional service" and establish a "calling for a culture of collegiality in our college of dentistry" (p. 604). The finding of this investigation, that 37.2 per cent of the variance is shared by the independent (perceived control, academic, and social integration) variables, provides support for Perry's observation that student academic performance in college is a complex process that involving student characteristics (perceived control) and the educational experience (academic and social integration).

Implications

Several important curricular and instructional suggestions may be drawn from the results of this investigation. The first deals with student/faculty relations. Faculty development programs which incorporate elements of the social context of learning literature might increase faculty awareness of the impact of their activities and thereby improve student/faculty relations. The results also have implications for faculty recruitment and selection. An important selection criterion for potential faculty members for the undergraduate dental program should be that individual's commitment to teaching and concern for student development.

The results of this study have some curricular implications. Curricular changes directed to encourage, facilitate, and enhance academic and social integration and foster a culture of collegiality (Nash, 1992) might positively influence student perceptions of the academic environment and ultimately lead to enhanced academic growth and development. The initiation of a student/faculty mentoring system, coupled with a more organized and structures class advising program, are examples of "low tech" institutional changes which might have a significant impact on academic and social integration, and may lead to improved academic growth and development.

This "case" has identified issues which almost inevitably will be shared by professional education more generally. This study might now be extended to other professional Faculties to determine the comparability and generalizability of the results, and to allow between-institution comparisons.

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